

CLAIMS:

- Sub A1
1. Surface-modified, pyrogenically produced oxides doped by aerosol.
  2. Surface-modified, pyrogenically produced oxides doped by aerosol, characterized in that the oxides are oxides from the group  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{TiO}_2$ ,  $\text{B}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{In}_2\text{O}_3$ ,  $\text{ZnO}$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{V}_2\text{O}_5$ ,  $\text{WO}_3$ ,  $\text{SnO}_2$ ,  $\text{GeO}_2$ .

3. Surface-modified, pyrogenically produced oxides doped by aerosol in accordance with claim 1 or 2, characterized in that they are surface-modified with one or several compounds from the following groups:

- a) Organosilanes of the type  $(\text{RO})_3\text{Si}(\text{C}_n\text{H}_{2n+1})$  and  $(\text{RO})_3\text{Si}(\text{C}_n\text{H}_{2n-1})$

R = alkyl

n = 1 - 20

- b) Organosilanes of the type  $\text{R}'_x(\text{RO})_y\text{Si}(\text{C}_n\text{H}_{2n+1})$  and  $(\text{RO})_3\text{Si}(\text{C}_n\text{H}_{2n+1})$

R = alkyl

R' = alkyl

R' = cycloalkyl

N = 1 - 20

Sub A1  
cont.

$$x+y=3$$

$$x=1, 2$$

$$y=1, 2$$

c) Halogen organosilanes of the type  $X_3 \text{Si}(\text{C}_n\text{H}_{2n+1})$  and  $X_3 \text{Si}(\text{C}_n\text{H}_{2n-1})$

$$X = \text{Cl}, \text{Br}$$

$$n = 1 - 20$$

d) Halogen organosilanes of the type  $X_2 (\text{R}') \text{Si}(\text{C}_n\text{H}_{2n+1})$  and

$$X_2 (\text{R}') \text{Si}(\text{C}_n\text{H}_{2n-1})$$

$$X = \text{Cl}, \text{Br}$$

$$\text{R}' = \text{alkyl}$$

$$\text{R}' = \text{cycloalkyl}$$

$$n = 1 - 20$$

e) Halogen organosilanes of the type  $X (\text{R}')_2 \text{Si}(\text{C}_n\text{H}_{2n+1})$  and

$$X (\text{R}')_2 \text{Si}(\text{C}_n\text{H}_{2n-1})$$

$$X = \text{Cl}, \text{Br}$$

$$\text{R}' = \text{alkyl}$$

$$\text{R}' = \text{cycloalkyl}$$

$$n = 1 - 20$$

f) Organosilanes of the type  $(\text{RO})_3\text{Si}(\text{CH}_2)_m\text{R}'$

Subst.  
cont.

R = alkyl

m = 0.1 - 20

R' = methyl-, aryl (e.g., -C<sub>6</sub>H<sub>5</sub>, substituted phenyl groups)

-C<sub>4</sub>F<sub>9</sub>, OCF<sub>2</sub>-CHF-CF<sub>3</sub>, -C<sub>6</sub>F<sub>13</sub>, -O-CF<sub>2</sub>-CHF<sub>2</sub>

-NH<sub>2</sub>, =N<sub>3</sub>, -SCN, -CH=CH<sub>2</sub>, -NH-CH<sub>2</sub>-CH<sub>2</sub>-NH<sub>2</sub>,

-N-(CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>NH<sub>2</sub>)<sub>2</sub>

-OOC(CH<sub>3</sub>)c = CH<sub>2</sub>

-OCH<sub>2</sub>-CH(O)CH<sub>2</sub>

-NH-CO-N-CO-(CH<sub>2</sub>)<sub>5</sub>

-NH-COO-CH<sub>3</sub>, -NH-COO-CH<sub>2</sub>-CH<sub>3</sub>, -NH-(CH<sub>2</sub>)<sub>3</sub>Si(or)<sub>3</sub>

-S<sub>x</sub>-(CH<sub>2</sub>)<sub>3</sub>Si(OR)<sub>3</sub>

-SH

-NR'R''R''' (R' = alkyl, aryl; R'' = H, alkyl, aryl; R''' = H, alkyl, aryl, benzyl, C<sub>2</sub>H<sub>4</sub>NR'''' R'''''' with R'''' = A, alkyl and R'''''' = H, alkyl)

g) Organosilanes of the type (R'')<sub>x</sub> (RO)<sub>y</sub>Si(CH<sub>2</sub>)<sub>m</sub>-R'

R'' = alkyl

x+y = 2

= cyclolalkyl

x = 1, 2

y = 1, 2

m = 0.1 to 20

R' = methyl-, aryl (e.g., -C<sub>6</sub>H<sub>5</sub>, substituted phenyl groups)

-C<sub>4</sub>F<sub>9</sub>, -OCF<sub>2</sub>-CHF-CF<sub>3</sub>, -C<sub>6</sub>F<sub>13</sub>, -O-CF<sub>2</sub>-CHF<sub>2</sub>

Sub A1  
cont.

$\text{-NH}_2$ ,  $\text{-N}_3$ ,  $\text{SCN}$ ,  $\text{-CH=CH}_2$ ,  $\text{-NH-CH}_2\text{-CH}_2\text{-NH}_2$ ,  
 $\text{-N-(CH}_2\text{-CH}_2\text{-NH}_2)_2$   
 $\text{-OOC (CH}_3\text{)C = CH}_2$   
 $\text{-OCH}_2\text{-CH(O) CH}_2$   
 $\text{-NH-CO-N-CO-(CH}_2\text{)}_5$   
 $\text{-NH-COO-CH}_3$ ,  $\text{-NH-COO-CH}_2\text{-CH}_3$ ,  $\text{-NH-(CH}_2\text{)}_3\text{Si(OR)}_3$   
 $\text{-S}_x\text{-(CH}_2\text{)}_3\text{Si(OR)}_3$   
 $\text{-SH}$   
 $\text{-NR'R''R'''} (R' = \text{alkyl, aryl; } R'' = \text{H, alkyl, aryl; } R''' = \text{H, alkyl, aryl, benzyl, } C_2H_4NR'''' R''''', \text{ with } R'''' = \text{A, alkyl and } R'''' = \text{H, alkyl})$

h) Halogen organosilanes of the type  $\text{X}_3\text{Si (CH}_2\text{)}_m\text{-R'}$

$\text{X} = \text{Cl, Br}$

$m = 0, 1 - 20$

$\text{R}' = \text{methyl-, aryl (e.g., -C}_6\text{H}_5\text{, substituted phenyl groups)}$

$\text{-C}_4\text{F}_9$ ,  $\text{-OCF}_2\text{-CHF-CF}_3$ ,  $\text{-C}_6\text{F}_{13}$ ,  $\text{-O-CF}_2\text{-CHF}_2$   
 $\text{-NH}_2$ ,  $\text{-N}_3$ ,  $\text{SCN}$ ,  $\text{-CH=CH}_2$ ,  $\text{-NH-CH}_2\text{-CH}_2\text{-NH}_2$ ,  
 $\text{-N-(CH}_2\text{-CH}_2\text{-NH}_2)_2$   
 $\text{-OOC (CH}_3\text{)C = CH}_2$   
 $\text{-OCH}_2\text{-CH(O) CH}_2$   
 $\text{-NH-CO-N-CO-(CH}_2\text{)}_5$

Sub A1  
cont.

-NH-COO-CH<sub>3</sub>, -NH-COO-CH<sub>2</sub>-CH<sub>3</sub>, -NH-(CH<sub>2</sub>)<sub>3</sub>Si(OR)<sub>3</sub>

-S<sub>x</sub>-(CH<sub>2</sub>)<sub>3</sub>Si(OR)<sub>3</sub>

-SH

i) Halogen organosilanes of the type (R)<sub>2</sub>Si(CH<sub>2</sub>)<sub>m</sub>-R'

X = Cl, Br

R = alkyl such as methyl, - ethyl-, propyl-

m = 0, 1 - 20

R' = methyl, aryl (e.g., -C<sub>6</sub>H<sub>5</sub>, substituted phenyl groups)

-C<sub>4</sub>F<sub>9</sub>, -OCF<sub>2</sub>CHF-CF<sub>3</sub>, -C<sub>6</sub>F<sub>13</sub>, -O-CF<sub>2</sub>-CHF<sub>2</sub>

-NH<sub>2</sub>, -N<sub>3</sub>, SCN, -CH=CH<sub>2</sub>, -NH-CH<sub>2</sub>-CH<sub>2</sub>-NH<sub>2</sub>,

-N-(CH<sub>2</sub>-CH<sub>2</sub>-NH<sub>2</sub>)<sub>2</sub>

-OOC (CH<sub>3</sub>)C = CH<sub>2</sub>

-OCH<sub>2</sub>-CH(O) CH<sub>2</sub>

-NH-CO-N-CO-(CH<sub>2</sub>)<sub>5</sub>

-NH-COO-CH<sub>3</sub>, -NH-COO-CH<sub>2</sub>-CH<sub>3</sub>, -NH-

(CH<sub>2</sub>)<sub>3</sub>Si(OR)<sub>3</sub>

-S<sub>x</sub>-(CH<sub>2</sub>)<sub>3</sub>Si(OR)<sub>3</sub>

-SH

(j) Halogen organosilanes of the type (R)<sub>2</sub>X Si(CH<sub>2</sub>)<sub>m</sub>-R'

X = Cl, Br

R = alkyl

Sub A1  
cont.

$m = 0, 1 - 20$

$R =$  methyl-, aryl (e.g.,  $-C_6H_5$ , substituted phenyl groups)

$-C_4F_9$ ,  $-OCF_2-CHF-CF_3$ ,  $-C_6F_{13}$ ,  $-O-CF_2-CHF_2$

$-NH_2$ ,  $-N_3$ ,  $SCN$ ,  $-CH=CH_2$ ,  $-NH-CH_2-CH_2-NH_2$ ,

$-N-(CH_2-CH_2-NH_2)_2$

$-OOC(CH_3)C=CH_2$

$-OCH_2-CH(O)CH_2$

$-NH-CO-N-CO-(CH_2)_5$

$-NH-COO-CH_3$ ,  $-NH-COO-CH_2-CH_3$ ,  $-NH-(CH_2)_3Si(OR)_3$

$-S_x-(CH_2)_3Si(OR)_3$

$-SH$

(k) Silazanes of the type  $R'_2Si-N-SiR'_2$

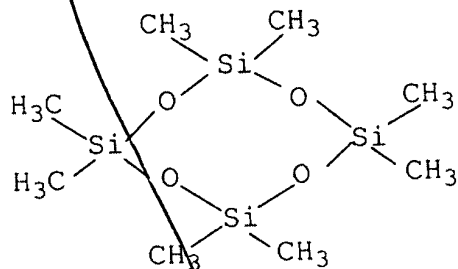
H

$R =$  alkyl

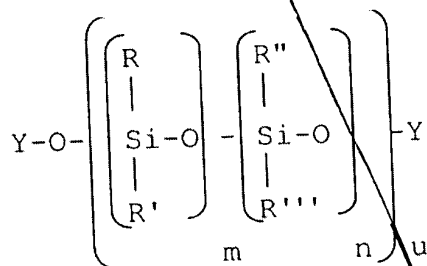
$R' =$  alkyl, vinyl

(l) Cyclic polysiloxanes of the type D 3, D 4, D 5, e.g.  
octamethylcyclotetrasiloxane = D4

Sub A2  
cont.



m) Polysiloxanes or silicone oils of the type



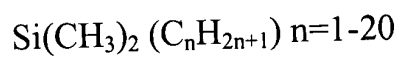
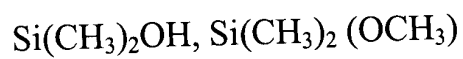
$$m = 0, 1, 2, 3, \dots \infty$$

$$n = 0, 1, 2, 3, \dots \infty$$

$$u = 0, 1, 2, 3, \dots \infty$$

$$Y=CH_3, H, C_nH_{2n+1} \quad n=1-20$$

$$Y=Si(CH_3)_3, Si(CH_3)_2H$$



R = alkyl, aryl,  $(CH_2)_n-NH_2$ , H

R' = alkyl, aryl,  $(CH_2)_n-NH_2$ , H

R'' = alkyl, aryl,  $(CH_2)_n-NH_2$ , H

R''' = alkyl, aryl,  $(CH_2)_n-NH_2$ , H

4. A method of producing the surface-modified oxides in accordance with claim 1 or 2, characterized in that pyrogenically produced oxides doped by aerosol are placed in a suitable mixing container, the oxides are sprayed under intensive mixing, optionally with water and/or acid at first and subsequently with a surface-modification reagent or a mixture of several surface-modification reagents, optionally re-mixed 15 to 30 minutes and tempered at a temperature of 100 to 400 °C for a period of 1 to 6 hours.

5. The use of the surface-modified oxides as reinforcing filler.

[illegible]